MONTHLY WEATHER REVIEW.

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The MONTHLY WEATHER REVIEW summarizes the current manuscript data received from about 3,500 land stations in the United States and about 1,250 ocean vessels; it also gives the general results of the study of daily weather maps based on telegrams or cablegrams from about 200 North American and 40 European, Asiatic, and oceanic stations.

The hearty interest shown by all observers and correspondents is gratefully recognized.

Acknowledgment is also made of the specific cooperation of the following chiefs of independent, local, or governmental services: R. F. Stupart, Esq., Director of the Meteorological Service of the Dominion of Canada; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. I. S. Kimball, General Superintendent of the United States Life-Saving Service; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Director Meteorological Office, London; Maxwell Hall, Esq., Government Meteorologist, Kingston, Jamaica; Rev. L. Gangoiti, Director of the Meteorological Observatory of Belen College, Havana, Cuba; Luis G. y Carbonell, Director, Meteorological Service of Cuba, Havana, Cuba; Rev. José Algué, S. J., Director of the Weather Bureau, Manila Central Observatory, Philippines; Maj. Gen. M. A. Rykachef, Director of the Physical Central Observatory, St. Petersburg, Russia; Carl Ryder, Director, Danish Meteorological Institute, Copenhagen, Denmark.

As far as practicable the time of the seventy-fifth meridian is used in the text of the MONTHLY WEATHER REVIEW.

Barometric pressures, both at land stations and on ocean vessels, whether station pressures or sea-level pressures, are reduced, or assumed to be reduced, to standard gravity, as well as corrected for all instrumental peculiarities, so that they express pressure in the standard international system of measures, namely, by the height of an equivalent column of mercury at 32° Fahrenheit, under the standard force, i. e., apparent gravity at sea level and latitude 45°.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

IN GENERAL.

The month opened with exceptionally high barometric pressure over the Asiatic and Iceland areas and low pressure over the western portion of the North American Continent and adjacent parts of the Pacific Ocean. An area of low barometer, with readings below 29.40 inches, was central near the southern coast of the North Sea, and a severe snowstorm, with gales and low temperature, prevailed over Great Britain, the North Sea, and adjacent coasts.

From the 1st to the 6th an area of low barometer advanced from the Pacific to the Atlantic coasts of the United States, attended by excessive precipitation in the Ohio and middle Mississippi valleys and the lower Lake region, and unusually warm and dry weather in the Gulf States. Following this depression a period of cool, dry weather set in on the Pacific coast.

From the 7th to the 14th the weather in the United States as a whole was warm and dry. Incoming trans-Atlantic steamers reported strong gales that attended the disturbance that past eastward from the American coast on the 7th. During the 7th and 8th heavy weather was experienced over the Leeward Islands of the Lesser Antilles, West Indies.

The night of the 12th the second severe storm of the month set in on the north Pacific coast, a wind velocity of 70 miles an hour being reported at North Head, Wash. This storm crost the continent during the following four days, attended by heavy and destructive rains in the north Pacific States, and by mild temperature and general rains, except in the Southern States, and was followed by a cool wave that carried freezing temperature and snow over Virginia and parts of North Carolina on the 20th, and caused heavy frost in the interior of the east Gulf States.

From the 10th to the 14th barometric pressure considerably above normal in the Iceland area and a depression over southwestern Europe, caused a period of wintry weather over western Europe. During the 16th and 17th the barometer rose above 31.00 inches in the Asiatic area, and a period of abnormally low temperature doubtless prevailed over the countries of southeastern Asia.

A depression over Bering Sea which closely followed the appearance of exceptionally high barometric pressure over the interior of Asia, crost the North American Continent during the first half of the third decade of the month, attended from the 22d to the 24th by heavy rains, local storms, and high temperature in the Gulf States that resulted in flooded streams in that section. In the Northern States temperature was below normal during this period.

On the 23d a decided fall in the barometer occurred in the Asiatic area. On that and the following date an energetic disturbance appeared on the north Pacific coast of the United States. This disturbance advanced with increasing strength to Lake Michigan by the 26th, and moved thence over the Canadian Maritime Provinces by the 27th, attended by strong gales over the Great Lakes and the north Atlantic coast. The depression was preceded and followed by cold waves. During the 24th and 25th an area of high barometer and a moderate cold wave dropt southward and eastward from the British Northwest Territory over Manitoba, the Red River of the North Valley and Lake Superior and extended thence eastward over Ontario, northern New York, and northern New England. The cold wave that followed the passage of the disturbance caused a decided fall in temperature from the northeastern Rocky Mountain slope over the upper Mississippi Valley and Lake region. On the 26th and 27th snow fell in the middle and upper Missouri valleys and thence over the northern Lake region.

On the morning of the 27th the Asiatic area again showed a marked decrease in pressure, and on the morning of the 28th a reading of 29.54 inches was reported at Irkutsk. The giving way of pressure in the Asiatic area for the second time in the third decade of the month afforded the first marked indication of a breaking up of the winter high area of that section and the first indication of a spring adjustment of barometric pressure over the Northern Hemisphere.

The month closed with a deep depression over the interior of the United States that was attended by an extensive rain area over the eastern portion of the country, and followed by an area of high barometer and a cold wave over Manitoba and the north-central States Over the Atlantic area the barometer was very low over Iceland and high over the Azores and southwestern Europe. Over the great Asiatic area after four days' depression the barometer had begun to rise. Over southern latitudes of the north Pacific Ocean pressure was above normal. The Pacific coast States were covered by an area of high barometer. This distribution of pressure indicated for the United States east of the Rocky Mountains several days of comparatively cool weather followed by a week or more of rather rapidly alternating periods of fair and showery weather and mild temperature.

BOSTON FORECAST DISTRICT.*

[New England.]

The month as a whole was mild for the season, with less than the usual amount of precipitation. Storms were fewer and less severe than usual for March, and as a result there was little damage and no great delays to shipping. Storm warnings were displayed in connection with all storms.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.*

[Louisiana, Texas, Oklahoma, and Arkansas.]

The month was mild and no general cold wave passed over the district. No storm warnings were issued and no general storm visited the west Gulf coast. Frost or freezing temperature warnings were issued on two dates and were partially verified.—*I. M. Cline, District Forecaster.*

LOUISVILLE FORECAST DISTRICT.*

[Kentucky and Tennessee.]

The month was milder than usual, with deficient precipitation, except in the north-central portion of Kentucky. Heavy rains the first and latter portions of the month caused floods in the Ohio River and tributaries. No special forecasts were issued.—*F. J. Walz, District Forecaster.*

CHICAGO FORECAST DISTRICT.*

[Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas, and Montana.]

Temperature was considerably above normal and no general cold wave occurred. Warnings for limited areas were, however, issued on five dates, which were followed by decided falls in temperature. Advisory messages were sent on several dates to open ports on Lake Michigan, and no casualties have been reported.—*H. J. Cox, Professor and District Forecaster.*

DENVER FORECAST DISTRICT.*

[Wyoming, Colorado, Utah, New Mexico, and Arizona.]

The month was quiet, with light precipitation and an excess of temperature, except in Utah and southwestern Wyoming. Cold-wave warnings were issued on the morning of the 25th for a cold wave that overspread Wyoming and northeastern Colorado, and on the 31st for southern Wyoming and extreme northeastern Colorado.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.†

[California and Nevada.]

The month was unusually dry, rain during the first five days being followed by a long rainless period. Frosts, for which ample warnings were issued, were frequent, but did no great injury. Snowfall in the mountains was very light as compared with last year.—*A. G. McAdie, Professor and District Forecaster.*

RIVERS AND FLOODS.

The only really disastrous floods of the month occurred in Washington, Oregon, and northwestern Idaho, where the general heavy rains that fell from the 13th to the 15th, inclusive, were quickly followed by floods, particularly in the smaller streams, resulting in great damage, much inconvenience, interruption to business, and considerable suffering. Railroads were washt out, bridges were torn from their foundations and carried down stream, and outbuildings and loose effects carried away. Many millions of feet of lumber were carried down stream, but this was not entirely an unmixt evil, as it solved the problem of transportation of the lumber to the mills or market with little or no expense. No detailed reports of this flood have been received, and it is impossible to express in figures the extent of losses and damage.

The Columbia River rose but little.

The rainfall of the month over the Ohio watershed was quite abundant, and two floods of fair magnitude were the result. Both were well forecast, and neither did any damage of consequence, altho at Pittsburg, Pa., where the second flood reached a crest stage of 27.3 feet at 1 a. m. of the 20th, about five hundred cellars and basements were flooded, their contents having been previously removed. The first flood began on the 2d, at Pittsburg, and the crest past into the Mississippi on the afternoon of the 18th, the stage of water at Cairo, Ill., being 45.55 feet, 0.55 foot above flood stage. The second flood began on the 19th, at Pittsburg, and at the end of the month the advance waters had just about reached Cairo.

Generally speaking, the Ohio River was high thruout the month, with mean stages of 41.9 and 42.7 feet, respectively, at Cincinnati, Ohio, and Cairo, Ill.

The lower Mississippi River also remained high, its normal condition during this season of the year, and at the end of February the flood crest of that month had just past New Madrid, Mo. The rise continued below, and at Greenville, Miss., the river was still rising slowly when the advance waters of the first Ohio River flood reached that place. The flood stage of 16 feet at New Orleans, La., was first reached on the 9th, and since that date the river has not been below the flood stage.

Warnings of all the high waters were issued whenever necessary, and they were very precise both as to stage and time.

Disastrous floods were also experienced along the interior rivers of Ohio, Indiana, and Illinois. The Wabash and White rivers rose from 7 to 9 feet above the flood stage and thousands of acres of land were under water, bridges were carried away, and several railroads were seriously handicapped by washouts. The Illinois River also rose from 8 to 11 feet above flood stage and caused considerable damage of the usual kind, tho perhaps not so much as in Indiana. In Ohio much less damage was done. These floods were well covered by warnings, except in northern Indiana, where no service is maintained, and thru the advices given much property was saved that otherwise would have been lost or greatly damaged.

The floods in the Grand River of Michigan were the product of a fair rainfall on the 5th and 6th, combined with the run-off from a snowfall that averaged more than twice the normal amount for the month of February. The situation was also complicated by ice gorges between Grand Ledge and Ionia, Mich. Previous to the beginning of the rain nearly the entire length of the river was covered by a solid sheet of ice, averaging more than 1 foot in thickness, but the rain of the 5th and 6th and the warm sunshine from the 9th to the 13th, inclusive, rotted it so that it soon broke up and past down with but little damage. The first warnings were issued on the 7th, and supplementary ones frequently thereafter. The warnings were of great benefit, especially at Grand Rapids, where large quantities of merchandise, etc., were removed to places of safety. The city officials were also enabled, thru a warning given four days in advance, to prevent the flood from reaching the west side of the city.

* Morning forecasts made at district center; night forecasts made at Washington, D. C.

† Morning and night forecasts made at district center.